GAO

May 2015

UNMANNED AERIAL SYSTEMS

Actions Needed to Improve DOD Pilot Training

		Form Approved OMB No. 0704-0188

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE **MAY 2015**	2. REPORT TYPE	3. DATES COVERED **00-00-2015 to 00-00-2015**

4. TITLE AND SUBTITLE **Umanned Aerial Systems: Actions Needed to Improve DOD Pilot Training**	5a. CONTRACT NUMBER
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **U.S. Government Accountability Office,441 G Street NW,Washington,DC,20548**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**48**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

UNMANNED AERIAL SYSTEMS

Actions Needed to Improve DOD Pilot Training

Why GAO Did This Study

The Department of Defense's (DOD) UAS portfolio has grown over the years to rival traditional manned systems, and, as of July 2013, DOD had acquired over 10,000 UAS, according to a 2013 DOD report. Training DOD UAS pilots, most of whom are in the Army or the Air Force, is an integral part of DOD's strategy to accomplish its mission. Senate Report 113-176 included a provision that GAO review DOD's efforts to train UAS pilots.

This report examines, among other things, the extent to which the Army and the Air Force (1) face challenges ensuring that their UAS pilots complete required training and (2) have taken steps to ensure they have sufficient numbers of UAS instructors. GAO analyzed DOD guidance on training UAS pilots, distributed a questionnaire to Army and Air Force headquarters and units, examined nongeneralizeable training records of seven Air Force UAS units selected because they have the same mission requirements, and interviewed DOD officials. GAO also conducted 18 focus groups with active duty UAS pilots who were selected based on rank and other factors. The results of the questionnaire and focus groups are not generalizable.

What GAO Recommends

GAO recommends, among other things, that the Army require unit status reports to include information on the readiness levels of UAS pilots; and the Army take additional steps to mitigate potential risks posed by its waiver of course prerequisites related to experience for pilots attending the course to become instructors. DOD concurred with each of GAO's recommendations.

View GAO-15-461 For more information, contact Brenda S. Farrell at (202) 512-3604 or farrellB@gao.gov.

What GAO Found

The Army and the Air Force face challenges ensuring that the pilots who remotely operate their unmanned aerial systems (UAS) complete their required training. Specifically, a March 2015 Army review showed that most pilots in certain Army units did not complete fundamental training tasks in fiscal year 2014—a finding that GAO corroborated through discussions with pilots in focus groups and unit responses to questionnaires. In addition, Army unit status reports do not require UAS pilot training information, and as a result, the Army does not know the full extent to which pilots have been trained and are therefore ready to be deployed. In addition, Air Force training records from a nongeneralizeable sample of seven UAS units showed that, on average, 35 percent of the pilots in these units completed the training for all of their required missions. Pilots in all of the seven focus groups GAO conducted with Air Force UAS pilots stated that they could not conduct training in units because their units had shortages of UAS pilots.GAO found similar shortages of UAS pilots in April 2014 and in particular, GAO found that the Air Force operated below its crew ratio, which is a metric used to determine the number of pilots needed in units. At that time, GAO made four recommendations including that the Air Force update its update crew ratio. The Air Force concurred with these recommendations and has taken actions, or has actions underway. For example, an Air Force Headquarters official stated that, in February 2015, the Air Force completed the first phase of a three-phase personnel requirements study on the crew ratio and expects to update the crew ratio in 2015. However, at this time, the Air Force has not fully implemented any of the recommendations.

The Army and the Air Force are taking actions to increase the number of UAS instructors, but the Army has not fully addressed the risks associated with using less experienced instructors and the Air Force faces instructor shortages. In order to increase the number of its instructors in response to an increase in the number of UAS units, the Army waived course prerequisites for about 40 percent of the UAS pilots attending the course to become instructor pilots from the beginning of fiscal year 2013 through February 2015.The Army originally established these prerequisites—such as a minimum number of flight hours—for UAS pilots volunteering to become instructors to help ensure that instructors were fully trained and ready to instruct UAS pilots. The Army has taken some steps to mitigate the potential risks of using less proficient UAS instructors. For example, beginning in fiscal year 2015, the Army no longer grants waivers for course prerequisites related to proficiency. However, the Army can continue to grant waivers for additional course prerequisites related to experience. As a result, the Army risks that its UAS pilots may not be receiving the highest caliber of training needed to prepare them to successfully perform UAS missions. Furthermore, as of March 2015, the Air Force had staffed its UAS training squadrons at Holloman Air Force Base at 63 percent of its planned staffing levels. This shortage is a key reason that the Air Force has shortages of UAS pilots across the Air Force, according to an Air Force headquarters official. The Air Force is studying the personnel requirements for its school and expects to report the results of this study by spring 2016.

Contents

Figure

Abbreviations

ACC	Air Combat Command
DOD	Department of Defense
DASD-Readiness	Deputy Assistant Secretary of Defense for Readiness
RPA	remotely piloted aircraft
UAS	unmanned aerial systems

May 14, 2015

Congressional Committees

The size, sophistication, and cost of the Department of Defense's (DOD) unmanned aerial systems (UAS)[1] portfolio has grown to rival its traditional manned systems and DOD reported that as of July 2013, it had acquired over 10,000 UASs.[2] In its *Unmanned Systems Integrated Roadmap FY2013-2038* report, DOD highlighted the importance of developing a comprehensive UAS training strategy to guide the myriad DOD UAS training efforts across all systems, and to help ensure effective and efficient training of UAS pilots.[3] The Defense Science Board reported that training was an integral part of DOD's strategy to accomplish its mission, and stated that military proficiency is dependent on the weapon system and on the warfighters who operate them and ignoring training is a waste of these resources.[4]

UAS pilot training is a topic of interest to members of Congress and about which we have recently reported. In March 2010, we found that DOD had not developed a strategy to resolve challenges that affect the ability of the Air Force and the Army to train personnel for UAS operations. Consequently, we recommended that DOD develop a results-oriented strategy to address these training challenges, which included limited access to restricted air space and limited opportunities to conduct joint

---

[1]The Department of Defense (DOD) defines an unmanned aerial system (UAS) as a system whose components include the necessary equipment, networks, and personnel to control an unmanned aircraft—that is, an aircraft that does not carry a human operator and is capable of flight under remote control or autonomous programming.

[2]Department of Defense, *Unmanned Systems Integrated Roadmap FY2013-2038.*

[3]The UAS pilot position is referred to by different names across the services: the Air Force uses the term Remotely Piloted Aircraft pilot; the Army uses UAS operator, the Navy uses air vehicle operator, and the Marine Corps uses unmanned aircraft commander. For purposes of this report, we use UAS pilot to describe the individual that makes operational decisions to control the flight of a UAS.

[4]Defense Science Board, *Report of the Task Force on Training for Future Conflicts: Final Report*, 2003.

training,[5] and DOD concurred with our recommendation.[6] More recently, the National Defense Authorization Act for Fiscal Year 2013 required the Secretary of the Air Force and the Chief of Staff of the Air Force to report on the education, training, and promotion rates of Air Force UAS pilots.[7] Furthermore, in April 2014, we found that Air Force UAS pilot shortages have had a negative effect on training for those pilots.[8] Specifically, we found that the Air Force had operated below its optimum number of UAS pilots in each unit; had not developed a minimum number of pilots per unit; had not tailored its approach to recruiting and retaining UAS pilots, and had not considered the viability of using personnel other than officers, such as enlisted or civilians, as UAS pilots. We recommended that the Air Force update the optimum number of UAS pilots (i.e., a crew ratio); establish a minimum crew ratio; develop a recruiting and retention strategy; and evaluate the viability of using enlisted or civilian personnel as UAS pilots. The Air Force generally concurred with our recommendations. Since we issued our report in April 2014, the Air Force has taken some actions to implement these recommendations, but has not fully implemented any of them. In appendix I, we provide further details on the findings of our April 2014 report, our recommendations, and Air Force actions taken in response to our recommendations.

A committee report accompanying a bill for the National Defense Authorization Act for Fiscal Year 2015 included a provision for us to review DOD's training for UAS pilots.[9] This report evaluates the extent to which (1) the Army and the Air Force face challenges, if any, in ensuring that their UAS pilots complete their required training; (2) the Army and the Air Force have taken steps to ensure they have a sufficient number of UAS pilot instructors; and (3) the Office of the Secretary of Defense and the military services coordinate on training UAS pilots.

---

[5]GAO, *Unmanned Aircraft Systems: Comprehensive Planning and a Results-Oriented Training Strategy Are Needed to Support Growing Inventories*, GAO-10-331 (Washington, D.C.: Mar. 26, 2010).

[6]The status of this recommendation is discussed later in the report.

[7]National Defense Authorization Act for Fiscal Year 2013, Pub, L. No. 112–239, § 527 (2013). The statutory provision refers to remotely piloted aircraft pilots, which we refer to as UAS pilots in this report.

[8]GAO, *Air Force: Actions Needed to Strengthen Management of Unmanned Aerial System Pilots,* GAO-14-316 (Washington, D.C.: Apr 10, 2014).

[9]S. Rep. No. 113-176, at 26-27 (June 2, 2014).

We focused our review on Army and Air Force UAS pilot training programs in our first two objectives because these services have significantly more UAS pilots than the Navy and the Marine Corps. For our first objective, we reviewed documents that outline training requirements for UAS pilots in the Army and the Air Force, including the Army's UAS Commander's Guide and Aircrew Training Manual and the Air Force's Ready Aircrew Program Tasking Memorandum.[10] In addition, we assessed the services' UAS pilot training programs using a set of core characteristics that constitute a strategic training program that we previously developed for assessing strategic training and development efforts in the federal government.[11] These characteristics include leadership commitment and communication as well as effective resource allocation. To identify the extent to which the military services incorporate these core characteristics in their training programs and face challenges in ensuring that their UAS pilots complete their required training, we developed a questionnaire based on these characteristics and on the services' UAS training programs. We distributed the questionnaire to each of the service's headquarters, training commands, and operational commands. To include diverse UAS unit perspectives, we also randomly selected a nongeneralizable sample of 14 UAS units in each of the services based on factors including aircraft types flown in the UAS unit and geographical location of the unit. We distributed the questionnaire to the commanders of the selected units. We attained an 85 percent response rate for the questionnaires. We analyzed responses we obtained from each of the questionnaires, and compared the perspectives we collected to the GAO criteria. We also reviewed a March 2015 Army Training and Doctrine Command review that evaluated continuation training for Army UAS units.[12] In addition, we reviewed continuation training requirements included in the Air Force's 2014 Ready Aircrew

---

[10]Army Training Circular No. 3-04.61, *Unmanned Aircraft System Commander's Guide and Aircrew Training Manual* (Jan. 10, 2014); Air Combat Command, *MQ-1 and MQ-9 Ready Aircrew Program Tasking Memorandum, Aviation Schedule 2014* (Nov. 21, 2013).

[11]GAO, *A Guide for Assessing Strategic Training and Development Efforts in the Federal Government*, GAO-04-546G (Washington, D.C.: Mar. 2004). To develop these characteristics, we consulted government officials and experts in the private sector, academia, and nonprofit organizations; examined laws and regulations related to training and development in the federal government; and reviewed literature on training and development issues, including previous GAO products on a range of human capital topics.

[12]We did not assess the validity of the Army's March 2015 review's methods or conclusions.

Program Tasking Memorandum. We compared these requirements to fiscal year 2014 training data for all seven of Creech Air Force Base's MQ-1 Predator and MQ-9 Reaper units that have the same mission requirements outlined in this memorandum.[13] Fiscal year 2014 is the most recent year for which the data were available. The results from these units are not generalizable to other UAS units or fiscal years.

For our second objective, we reviewed the Army UAS instructor course prerequisites that provide requirements for instructors regarding their rank, the number of hours they have flown a UAS, and other factors. We compared these course prerequisites to the most recent Army documentation on UAS operators who attended the Army school to become an instructor in fiscal year 2013, fiscal year 2014, and October 2014 to February 2015, to identify the extent to which instructors met these course prerequisites during that time period. We also compared Air Force documentation on the actual numbers of Air Force UAS pilots in Air Force UAS assignments to the Air Force planned number of positions for UAS pilots. In addition, we compared the actual numbers of Air Force UAS instructor pilots at the formal training unit at Holloman Air Force Base to the Air Force planned number of positions at the formal training unit. In addition, we visited UAS units at five bases: Ft. Huachuca, AZ; Ft. Hood, TX; Holloman Air Force Base, NM; Creech Air Force Base, NV; and Marine Corps Air Station Cherry Point, NC. We selected the locations on the basis of several factors including the type and size of UAS flown in the unit; missions of the unit; whether or not the unit is deployed (we did not meet with units who were deployed); number of UAS pilots in the unit; the major command of the unit; and location of the unit. At each instillation, we met with unit commanders and other leaders to discuss their views about training UAS pilots. We also conducted 18 focus groups with active-duty UAS pilots at these locations to gain their perspectives on

---

[13]Creech Air Force Base has the most MQ-1 and MQ-9 UAS units in the Air Force. There are seven MQ-1 and MQ-9 UAS units at Creech Air Force Base that are responsible for achieving the mission requirements outlined in the Air Force's 2014 Ready Aircrew Program Tasking Memorandum. We reviewed fiscal year 2014 training completion data for each of those seven UAS units at Creech Air Force Base. Also, according to Air Force officials, the remaining four UAS units at Creech Air Force Base do not have the same mission requirements as those included in the memorandum, so we did not include these units in our review.

their services' UAS training efforts. [14] To select specific UAS pilots to participate in our focus groups, we worked with officials at each of the instillations to develop a diverse group of active-duty UAS pilots. To obtain a variety of perspectives, we selected UAS pilots with varying amounts of experience flying UASs and additional duties in their units. The opinions of UAS pilots we obtained during our focus groups are not generalizable to the populations of all UAS pilots. We also interviewed the Director of Training at the Army's initial qualification school at Fort Huachuca, and officials at Army Headquarters and the Wing Commander, Operations Group and UAS unit commanders at the Air Force's formal training unit at Holloman Air Force Base.

For our third objective, we assessed the extent to which the Office of the Secretary of Defense and the military services coordinate on training UAS pilots using key practices for enhancing and sustaining collaboration among federal agencies that we previously developed.[15] These key practices include defining and articulating a common outcome for coordinated efforts and establishing mutually reinforcing or joint strategies. We assessed the department's actions using seven of the eight key practices. We excluded one key practice related to reinforcing individual accountability for collaborative efforts through performance management systems. Evaluating this practice involves assessing the extent to which agencies set expectations for senior executives for collaboration within and across organizational boundaries in their individual performance plans. We did not include this key practice in our review because many of the officials who oversee UAS pilot training in the services are military members, and the military does not establish individual performance plans for its servicemembers. To identify the

---

[14]We did not conduct Navy focus groups because its pilots would not be able to discuss the Navy's current training program, which includes an additional two weeks of instruction. Previously, contractors trained all of the Navy's UAS pilots, but in January 2015 the Navy began training its pilots.

[15]GAO, *Results-Oriented Government: Practices That Can Help Enhance and Sustain Collaboration among Federal Agencies*, GAO-06-15 (Washington, D.C.: Oct. 21, 2005). To develop these key practices, we reviewed academic literature and prior GAO and Congressional Research Service reports. In addition, we interviewed experts in coordination, collaboration, partnerships, and networks from the National Academy of Public Administration, the IBM Center for The Business of Government, and the University of California, Berkeley. Using our literature review and interviews, we derived a set of practices that we believe can help enhance and sustain federal agency collaborative efforts and that are consistent with results-oriented performance management and agency requirements under the Government Performance and Results Act of 1993.

extent to which the DOD organizations applied these key practices, we analyzed documentation such as guidelines for a UAS training strategy that the Office of the Deputy Assistant Secretary of Defense for Readiness provided to the RAND Corporation, and interviewed officials from the Office of the Deputy Assistant Secretary of Defense for Readiness and knowledgeable offices within each military service. We compared this information to the key practices to determine the extent to which the Office of the Deputy Assistant Secretary of Defense for Readiness and the military services coordinate and collaborate with one another to train UAS pilots. We assessed the reliability of the data used to directly support findings in the development of this report by reviewing related documentation and interviewing agency officials knowledgeable about the data. Specifically, we assessed the reliability of the Air Force's fiscal year 2014 data on continuation training completed by seven UAS units at Creech Air Force Base to fulfill requirements laid out in the Air Combat Command Ready Aircrew Program Tasking Memorandum, the Army's fiscal year 2013 to February 2015 data on waivers granted to UAS pilots attending the UAS school to become instructors,[16] and March 2015 data on the Air Force's current UAS pilot staffing levels and staffing levels at the formal training unit.[17] We determined that these data were sufficiently reliable for the purposes of this report. We provide further details on our scope and methodology in appendix II.

We conducted this performance audit from July 2014 to May 2015 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

---

[16]The Army may waive training and currency requirements for UAS pilots pursuant to Army Regulation 95–23, *Unmanned Aircraft System Flight Regulations* 1-7b, 4-2 (July 2, 2010).

[17]We selected these dates, because they are the most recent years for which the data were available.

Background

Unmanned Aerial Systems

DOD defines a UAS as "a system whose components include the necessary equipment, networks, and personnel to control an unmanned aircraft"[18]—that is, an aircraft that does not carry a human operator and is capable of flight under remote control or autonomous programming. DOD classifies its UAS into five groups that are based on attributes of weight and capabilities including vehicle airspeed and operating altitude. For example, group 1 UAS weigh 20 pounds or less whereas group 5 UAS weigh more than 1,320 pounds.[19] Servicemembers who operate the larger and more capable UAS, in group 3 or above, are either manned-aircraft pilots or pilots specializing in flying UAS and are to receive 4 or more months of training to prepare them to fly UAS. In contrast, personnel who operate the less capable UAS that are classified in groups 1 and 2 generally operate UAS as an additional duty. Service headquarters officials stated that personnel who operate UAS in group 1 receive about 2 weeks of training and personnel who operate UAS in group 2 receive anywhere from 2 weeks to 3 months of training.

Each of the services flies various types of large UAS in groups 3, 4, and 5. The Air Force flies the MQ-1 (Predator), the MQ-9 (Reaper), and the larger RQ-4 (Global Hawk). The Army flies the RQ-7 (Shadow), the MQ-5 (Hunter) and the MQ-1C (Gray Eagle). The Marine Corps flies the RQ-7B (Shadow) and the RQ-21A (Black Jack). Finally, the Navy flies the MQ-4C (Triton) and the MQ-8 (Fire Scout).

UAS Personnel Staffing

Each service uses a different term to refer to the UAS pilot position and a different strategy to assign personnel to this position. For example, the Air Force uses the term remotely piloted aircraft (RPA) pilot and assigns officers to this position. Specifically, the Air Force assigns various types of officers to serve in these positions including (1) temporarily re-assigned manned-aircraft pilots, (2) manned-aircraft pilots and other Air Force aviation officers who have converted to this career permanently, (3) graduates of manned-aircraft pilot training on their first assignment, and

---

[18] Joint Publication 3-52, *Joint Airspace Control*, GL-13 (May 20, 2010).

[19] Chairman of the Joint Chiefs of Staff Instruction 3255.01, *Joint Unmanned Aircraft System Minimum Training Standards* at 4 (Oct. 31, 2011).

(4) pilots who specialize in flying UAS with limited manned-aircraft experience. The Army uses the term unmanned aircraft system operator and assigns enlisted personnel to this position, who receive no manned-aircraft flight training. See table 1 for a summary of the terms and the staffing strategies each service uses.

Table 1: Position Terms and Personnel Staffing Strategies Used by the Military Services for Unmanned Aerial System Pilots

Service	Term used for Unmanned Aerial System (UAS) pilots	Personnel assigned to be UAS pilots	Use of manned-aircraft pilots as UAS pilots	UAS pilot specialist career	Manned-aircraft training of personnel
Air Force	Remotely piloted aircraft pilot	Officers	Yes	Yes	• All personnel receive manned-aircraft flight training
Army	Unmanned aircraft system operator	Officers overseeing enlisted personnel[a]	No	Yes	• No personnel receive manned-aircraft flight training
Marine Corps	Unmanned aircraft commander	Officers overseeing enlisted personnel[b]	Yes	Yes	• All personnel receive manned-aircraft flight training
Navy	Air vehicle operator	Officers	Yes	No	• All personnel are manned-aircraft pilots and receive manned-aircraft flight training

Source: GAO analysis of DOD data | GAO-15-461

[a]The Army also assigns warrant officers who specialize as UAS Operations Technicians. These personnel develop UAS requirements, coordinate airspace requirements, and act as the Army liaisons for all UAS missions.

[b]The Marine Corps assigns enlisted personnel to operate the flight controls of a UAS and to operate UAS sensors as well as officers as part of the UAS aircrew to oversee the actions of the enlisted aircrew.

Training for Pilots of Unmanned Aerial Systems

The services are responsible for providing three types of individual training to UAS pilots: initial qualification, mission, and continuation training.[20] Each of the services is responsible for providing initial qualification training to UAS pilots in two phases. In the first phase, pilots are taught the fundamentals of aviation and in the second phase pilots learn to fly a particular UAS. Each of the services uses similar but slightly different approaches to train their UAS pilots.

[20]The services also are to provide collective training to their UAS units in which UAS pilots participate.

- **Army.** The first phase of training consists of an 8-week common core course for all UAS pilots. During this phase, the Army is responsible for teaching its pilots the fundamentals of aerodynamics, flight safety, and navigation. During the second phase of training, the Army is responsible for teaching its UAS pilots to fly one of the Army's three UAS. This training lasts between 12 and 25 weeks depending on the UAS that is the focus of the course. During this phase, the Army teaches its pilots to launch and recover a UAS, conduct reconnaissance and surveillance, and participate in a field training exercise. In addition, all Army UAS pilots are trained as sensor operators in the aircrew of a UAS. Thus, pilots learn to operate UAS sensors during their initial qualification training.

- **Air Force.** During the first phase of training, UAS pilots who specialize in flying a UAS attend 5 months of training called undergraduate UAS training. This training consists of three courses: first, these pilots learn to fly a small manned aircraft for 39 hours; second, they use a simulator to learn to fly a manned aircraft using instruments; and third, they learn about the fundamentals of flying a UAS in a classroom setting. Air Force UAS pilots who the Air Force re-assigns from its manned-aircraft pilot ranks do not attend this first phase of training because they received flight training as manned-aircraft pilots. During the second phase of training, all UAS pilots attend a 4-month course at a formal training unit to learn to fly one of the Air Force's three UAS platforms. Most active duty Air Force pilots attend the formal training unit at Holloman Air Force Base to learn to fly the Air Force's MQ-1 Predator or MQ-9 Reaper.

- **Marine Corps.** During the first phase of training, UAS pilots who specialize in flying a UAS attend 5 months of training with the Air Force called undergraduate UAS training. This training consists of three courses: First, these pilots learn to fly a small manned aircraft for 39 hours; second, they use a simulator to learn to fly a manned aircraft using instruments; and third, they learn about the fundamentals of flying a UAS in a classroom setting. During the second phase of training, Marine Corps UAS pilots attend the Army's 8-week UAS pilot common course and 10-week UAS pilot training

courses at Fort Huachuca to become familiar with flying the RQ-7 Shadow, which the Marine Corps flies.[21]

- **Navy.** In January 2015, the Navy began providing a 7- to 8-week UAS initial qualification course in San Diego, CA to its pilots of the MQ-8 Fire Scout, which is a rotary wing UAS. The Navy assigns manned-helicopter aircraft pilots who receive manned helicopter training and have served, or are serving, in an assignment in a manned-helicopter squadron prior to attending this course. As of March 2015, the Navy is developing plans for its initial qualification course for its MQ-4C Triton, which is a fixed-wing UAS.

The services also provide mission and continuation training to their UAS pilots. Mission qualification training includes all training that takes place once a servicemember reaches their operational unit but before that servicemember is designated as being qualified to perform the unit's missions. Continuation training includes all training that takes place once a servicemember finishes mission qualification training and is designed to maintain and improve UAS piloting skills.

---

[21]The Army reported that in fiscal year 2013 the Army trained 53 Marine Corps UAS pilots; in fiscal year 2014 the Army trained 50 Marine Corps UAS pilots; and as of March 2015, the Army has trained 16 Marine Corps UAS pilots in fiscal year 2015. In addition, there are 59 Marine Corp UAS pilot spaces at the Army UAS school allocated for fiscal year 2016 and 67 Marine Corps UAS pilots for fiscal 2017.

The Army and the Air Force Face Challenges Ensuring that Their UAS Pilots Complete Their Required Training

Most Army UAS Pilots Are Not Completing All of Their Unit Training, and the Army Does Not Have Visibility over Whether UAS Pilots in Units Have Completed Training

Most Army UAS Pilots Are Not Completing Continuation Training

A March 2015 Army review showed that pilots in most Army Shadow units[22] did not complete training in their units in fiscal year 2014, which we corroborated through both discussions with pilots in our focus groups and unit responses to our questionnaires. One of the core characteristics of a strategic training and development process calls for agency leaders and managers to consistently demonstrate that they support and value continuous learning.[23] However, the Army's Training and Doctrine Command conducted a review from January 2015 through March 2015 and found that 61 of the Army's 65 Shadow units that were not deployed had completed an average of 150 hours of flight training. Further, the Army assessed that these units were at the lowest levels of unit training proficiency in the Army's readiness reporting system.

Army Training and Doctrine Command officials stated that in January 2015, the Chief of Staff of the Army directed the Army Training and Doctrine Command to evaluate unit training for Army UAS units to

---

[22] For the purposes of this report, we define Army Shadow units as units in the Army that fly the RQ-7B Shadow UAS. The pilots of Shadow units constitute the majority of Army UAS pilots

[23] GAO-04-546G.

determine if training was a factor that caused UAS mishaps in combat. These officials stated that in response to the Chief of Staff's direction they evaluated the total flight hours completed to conduct training by 65 Shadow units that were not deployed, 13 deployed Shadow units, and 2 Shadow units at the UAS initial qualification school at Ft. Huachuca. Training and Doctrine Command assessed the level of unit readiness associated with the amount of training these units completed using the Army's unit training proficiency system specified in Army Pamphlet 220-1, *Defense Readiness Reporting System-Army Procedures*.[24] This system includes a four-tiered rating system ranging from T-1 to T-4. In this system a T-1 rating indicates the highest level of unit training proficiency, whereas T-3 and T-4 ratings indicate that the unit is untrained on one or more of the mission essential tasks that the unit was designed to perform in an operational environment.[25] Using this system to assess the 65 Shadow units that were not deployed, Training and Doctrine Command found that 1 unit was rated at T-1, 3 units were rated at T-2, and 61 units were rated at T-3 or T-4. In addition, Training and Doctrine Command found that 11 of the 13 deployed units were rated T-1 and the other 2 deployed Shadow units were rated T-2, and both of the units at the UAS training school were rated at T-1 (see table 2).

Table 2: Fiscal Year 2014 Army UAS Shadow Units' Training Proficiency Levels

	T1 Proficiency Level (greater than 440 hours)	T2 Proficiency Level (340 to 440 hours)	T3 or T4 Proficiency Level (less than 340 hours)	Total Number of Units
Shadow units not deployed	1	3	61	65
Deployed Shadow units	11	2	0	13
Shadow units located at the UAS initial qualification school at Ft. Huachuca	2	0	0	2

Source: GAO analysis of Army data. | GAO-15-461

[24]Army Pamphlet 220-1, *Field Organizations, Defense Readiness Reporting System-Army Procedures*, November 16, 2011.

[25] According to Army documents, annual training readiness levels T-3/T-4 apply where less than 340 hours of readiness training have been accomplished, T-2 applies between 340 to 440, and T-1 applies where greater than 440 hours of readiness training have been accomplished.

Army Training and Doctrine Command found a number of factors led to UAS pilots in Army Shadow units not completing training in their units in fiscal year 2014. For example, the review found that UAS units organized under infantry brigades have a particular challenge completing training in their units because the unit commanders and leadership overseeing these brigades may not be fully aware of the UAS units' training requirements. In addition, the review found that a number of warrant officers were not qualified and current on the units' aircraft that they were assigned to oversee. The review included recommendations that the Army plans to implement to increase emphasis on training in UAS units, to provide training on UAS training to unit commanders, and to establish a system to report UAS training readiness on periodic unit status reports. However, as of April 2015 the Army had not yet taken actions to implement these recommendations, and Army Training and Doctrine Command officials were unable to provide a timeframe for implementation of the recommendations.

Similarly, focus groups we conducted with Army UAS pilots and responses to questionnaires we administered indicated that Army UAS pilots face challenges to complete training in units. In particular, pilots in all eight of the focus groups we conducted with Army UAS pilots stated that they cannot complete training in their units. For example, a pilot in one of our focus groups stated that during his 3 years as a UAS pilot, he had been regularly tasked to complete non-training-related activities, and as a result he completed a total of 36 training flight hours even though the requirement is 24 flight hours per year. Further, we administered a questionnaire to various offices within each military service and five of the six Army UAS units that responded indicated that their units faced challenges completing training in their units. For example, one unit respondent stated that Army UAS units rarely have the time to meet their training requirements. A second unit respondent stated that Army UAS units are taxed trying to maintain proper training in units and have little time to progress into proficient pilots due to training equipment and resource constraints. A third respondent stated that training in units is very limited due to competing priorities, including being consistently tasked by Army Forces Command to train other units, which prevents their unit from training their own UAS operators. In addition, four of the six Army UAS units that responded stated that the Army provides too little funding for the training that takes place in units to help ensure that this training achieves the Army goals for that training.

Further, focus groups we conducted with Army UAS pilots and some Army officials indicated that leadership of larger non-aviation units that

oversee Army UAS units may not fully understand the training needs for Army UAS pilots. Specifically, pilots in seven of the eight focus groups that we conducted with Army UAS pilots stated that leadership of larger non-aviation units that oversee their UAS units do not understand UAS pilot training. Moreover, four of the six units that responded to our questionnaire indicated that leadership of larger non-aviation units that oversee Army UAS units lacks understanding of UAS unit training needs. For example, a unit official who responded to our questionnaire stated that Army headquarters leadership provides very limited support for UAS continuation training. Another unit official who responded to our questionnaire stated that "unit leadership has a fundamental lack of understanding of our training requirements." In addition, officials at Army Forces Command and an official who oversees Army UAS assignments at Army Human Resources Command stated that infantry commanders at the battalion and brigade level who oversee UAS units do not understand the aviation training requirements for Army UAS pilots. Further, Army UAS pilots in all of the focus groups we conducted stated that they had difficulty completing UAS pilot training in units because they spend a significant amount of time performing additional duties such as lawn care, janitorial services, and guard duty.[26]

While the Army review and our analysis show that most Army UAS pilots are not completing training in their units, the high-level interest expressed by the Chief of Staff of the Army and Army Training and Doctrine Command's review and associated recommendations, if effectively implemented, could help address the Army's training shortfalls.

Army Does Not Have Visibility over the Amount of Training that Pilots in Some UAS Units Have Completed

The Army does not have visibility over the amount of training that pilots in some Army UAS units have completed. Another one of the core characteristics of a strategic training framework highlights the importance of quality data regarding training.[27] However, in our current review, we found that the Army does not have access to data that would allow it to

---

[26]Army personnel reported to us that these UAS pilots performed these tasks under the borrowed military personnel program, which is a program in which military personnel are used to perform work previously performed by government civilians or contracted services. We have ongoing work regarding the Army's use of borrowed military personnel, which will be issued later this year, that addresses the extent to which the Army used borrowed military personnel and if the Army considered costs when making decisions to use borrowed military personnel.

[27] GAO-04-546G.

measure the amount of training that UAS pilots have completed in Army UAS units. The Army's Unmanned Aircraft System Commander's Guide and Aircrew Training Manual establishes three readiness levels for Army UAS pilots. [28] Readiness level training begins with the development of proficiency at the individual level at readiness level three and progresses through crew to collective proficiency at readiness levels two and one. The Army assigns readiness level designations to UAS pilots to identify the training that UAS pilots have completed and the training that they need to complete to progress to the next level of readiness.

Army Forces Command identifies the Army UAS units that are ready to deploy, according to Army Forces Command officials. Army Forces Command officials stated that they need information about the readiness level of pilots in UAS units to determine if a unit is ready to deploy and perform its mission. These officials stated that currently they review Army unit status reports to determine if a unit is prepared to deploy. These officials stated that Army unit status reports provide information on a variety of factors related to a unit's readiness to perform its mission including the unit's materiel, personnel staffing levels, and an assessment of a unit's training. However, officials from Army headquarters, Army Forces Command, and Army Aviation Center of Excellence stated that these reports do not provide any information on the readiness levels of the UAS pilots in UAS units because the Army does not require these reports to include this information. In addition, the organizational structure of many Army UAS units is an impediment to visibility over training completed in these units. Specifically, the Army's RQ-7B Shadow units are organized under larger units. According to Forces Command officials, these larger units oversee multiple smaller units, including UAS units and other units that have different functions, such as intelligence. However, these officials also stated that the readiness information for these UAS units is combined with training information from other, non-UAS units in the unit status reports because unit status reports do not provide lower-unit level details. Officials at Forces Command stated that, using these reports, they have designated units as available for deployment and later learned that a significant portion of the pilots in those units had not completed their readiness level training. Without requiring information on the readiness of pilots in UAS units as part of unit status reports, Army

---

[28]Army Training Circular No. 3-04.61, *Unmanned Aircraft System Commander's Guide and Aircrew Training Manual*, pages 2-7-2-10 (Jan. 10, 2014).

Forces Command will continue to lack visibility over the amount of training that UAS pilots have completed in units.

Air Force UAS Pilots Do Not Complete the Majority of Their Continuation Training

Air Force officials stated that Air Force UAS pilots do not complete the majority of their required continuation training, even though an Air Force memorandum allows pilots to credit operational flights towards meeting training requirements.[29] Another one of the core characteristics we found constitutes a strategic training framework is that agency leaders and managers consistently demonstrate that they support and value continuous learning.[30] However, in December 2014, the commanding general of Air Combat Command wrote in a memo to the Chief of Staff of the Air Force that since 2007, Air Force UAS units have conducted "virtually no continuation training" because the Air Force has continuously surged to support combatant command requirements. Additionally, Air Force officials at a number of locations stated that Air Force UAS pilots rarely conduct continuation training for any of their unit's missions. These locations include headquarters, Air Combat Command, as well as the Vice Wing Commander and multiple squadron commanders at Creech Air Force Base and the Wing and Operations Group Commanders at Holloman Air Force Bases.

We found that a nongeneralizable sample of training records for seven Air Force UAS units showed that, on average, 35 percent of the pilots in these units completed the continuation training for all of their seven required missions in fiscal year 2014. The situation occurred despite an Air Combat Command memorandum that allows pilots to credit flights taken on operational missions towards continuation training requirements,

---

[29] Air Combat Command, *MQ-1 and MQ-9 Ready Aircrew Program Tasking Memorandum, Aviation Schedule 2014*, 3a, 5b.1 (Nov. 21, 2013). This memorandum allows certain required training events to be logged in either flight or in flight simulators, with the option to meet shortfalls in simulator hours with flight hours. Also, all flight hours are to be logged, regardless of location flown (meaning regardless of whether they are training flights or operational). That said, pursuant to Air Force Instruction 11-2MQ-1 Volume 1, in order to receive credit for events and missions, specific events must be accomplished for each tactical mission scenario or basic skills mission. Thus, in order to be effective, each mission must successfully complete a sufficient number of events applicable to that mission type, as determined by the Squadron Commander. All such effective missions and events must be tracked and are counted toward total annual flying training requirements.

[30] GAO-04-546G.

provided that the flights meet certain conditions.[31] This memorandum also requires UAS pilots to conduct specified numbers of training flights associated with each of the missions that MQ-1 Predator and MQ-9 Reaper units perform. We found that 91 percent or more of the pilots in the seven units completed continuation training for one of the seven missions, specifically the intelligence, surveillance, and reconnaissance mission, which involves obtaining information about the activities and resources of an enemy. In contrast, an average of 26 percent of pilots in these seven units completed the continuation training for another one of the seven missions, the air interdiction mission, which involves diverting or destroying the enemy's military potential.[32] Air Force officials stated that operational flights do not provide an ideal environment to conduct training because pilots are not able to perform all of the tasks needed for a training flight during operational missions. Moreover, Creech Air Force Base officials also stated that UAS pilots at Creech Air Force Base conduct continuation training on less than two percent of all the hours that UAS pilots on Creech Air Force Base currently fly.

According to Air Force officials, some Air Force UAS pilots have not completed their continuation training because they spend most of their time conducting operational missions due to shortages of UAS pilots and high workloads. In addition, Creech Air Force Base officials stated that UAS pilots perform one to two of their required missions regularly based on operational needs, which also allows them to fulfill training requirements for those missions. However, due to shortages of UAS pilots and high workloads some pilots do not complete training requirements for their other five to six missions. As of March 2015, the Air Force has staffed the UAS pilot career field at 83 percent of the total number of UAS pilots that the Air Force believes are necessary to sustain

---

[31]Air Combat Command, *MQ-1 and MQ-9 Ready Aircrew Program Tasking Aviation Memorandum Schedule 2014* 3a, 5b.1 (Nov. 21, 2013). This memorandum specifies the training requirements for pilots assigned to MQ-1 Predator and MQ-9 Reaper units that are assigned to Air Combat Command. Most of the UAS that the Air Force flies are either MQ-1 or MQ-9. In addition, about 77 percent of active duty Air Force UAS pilots are assigned to units in Air Combat Command.

[32]According to a Creech Air Force Base official, the operations group commander who oversees three of these units did not require pilots in these three units to conduct continuation training for four of their missions in fiscal year 2014 due to UAS pilot shortages and other resource constraints.

current UAS operations and training.[33] We conducted focus groups with seven groups of Air Force UAS pilots and pilots in all these groups stated that they could not conduct continuation training because their units were understaffed. In addition, Air Force headquarters officials stated that they think the current number of UAS pilots that the Air Force has approved for its UAS units is not enough to accomplish the workload of UAS units. As a result, workloads for Air Force UAS units are high, and in January 2015, the Secretary of the Air Force stated that on average Air Force UAS pilots fly 6 days in a row and work 13- to 14-hour days.

In April 2014, we found that the Air Force had shortages of UAS pilots and we made multiple recommendations to address these shortages.[34] In particular, we found that the Air Force had operated below its optimum crew ratio, which is a metric used to determine the personnel needs for Air Force aviation units, and that the Air Force had not tailored its recruiting and retention strategy to align with the specific needs and challenges of UAS pilots. We made four recommendations related to these findings including that the Air Force update crew ratios for UAS units to help ensure that the Air Force establishes a more accurate understanding of the required number of UAS pilots needed in its units and that the Air Force develop a recruiting and retention strategy that is tailored to the specific needs and challenges of UAS pilots to help ensure that the Air Force can meet and retain required staffing levels to meet its mission.

The Air Force concurred with these recommendations and has taken some actions but has not yet fully implemented them. Specifically, a headquarters Air Force official stated that, in February 2015, the Air Force completed the first phase of a three-phase personnel requirements study designed to update the UAS unit crew ratio. The headquarters official also stated that Air Force senior leaders are reviewing the results of the first phase of the study and expect to update the UAS unit crew ratio by summer 2015. In addition, in fiscal year 2014, the Air Force began using a new process that provides the Air Force with greater flexibility to assign cadets who were preparing to join the Air Force. Under this process, the

---

[33]This 83 percent staffing level is a reduction from the 85 percent level that the Air Force staffed this career field at in December 2013.

[34]GAO, *Air Force: Actions Needed to Strengthen Management of Unmanned Aerial System Pilots,* GAO-14-316 (Washington, D.C.: Apr. 10, 2014).

cadets are assigned to various Air Force careers, which enabled the Air Force to meet its quota for the number of cadets who graduate from Air Force officer schools and agree to serve as UAS pilots. Further, in January 2015, the Air Force more than doubled the Assignment Incentive Pay for UAS pilots who are reaching the end of their 6-year service commitment to $1500 a month. As noted above, the Air Force continues to face a shortage of UAS pilots, but fully implementing our April 2014 recommendations would better position the Air Force to address these shortages. See additional information on these recommendations and the Air Force's actions to date in appendix I.

The Army and the Air Force Have Taken Actions to Increase the Number of Instructors in UAS Units, but the Army Has Not Fully Addressed Potential Risks that Could Hinder the Success of Its UAS Pilot Training

The Army Has Taken Action to Increase the Number of Instructors, but Its Use of Less Experienced Instructors Could Affect the Quality of UAS Pilot Training

The Army has taken action to increase the number of UAS pilot instructors, but in doing so, it is using less experienced instructors, which could affect the quality of the training provided to UAS pilots. The Army significantly increased the number of UAS units and UAS pilots in recent years, and as a result many lack the experience and proficiency needed to be an instructor, according to officials from the Army Aviation Center of Excellence. To address this shortage and accommodate the need for more instructors, the Army began to waive course prerequisites for the UAS instructor course so that it could enable these less experienced and

less proficient UAS pilots to become instructors, according to officials from the Army Aviation Center of Excellence.[35]

Army Aviation Center of Excellence officials also stated that the instructor course prerequisites are important because they help ensure that the UAS pilots the Army trains to become instructors are the most experienced and most proficient pilots and can successfully train other UAS pilots. One of the officials also stated that the Army would prefer not to grant waivers to any UAS pilot attending the course so that the pilots who become instructors would be experienced and able to share their experiences with the pilots they train. In contrast, pilots with less experience may not be able to refer to and use more varied experiences during instructional time with UAS pilots and thus may not be as prepared to successfully train other UAS pilots to perform at the highest levels of proficiency.

The instructor course prerequisites include a minimum rank, a minimum number of flying hours piloting a UAS, whether a pilot has completed their readiness level training, and whether a pilot has recently completed certain flying tasks—known as currency. For example, the Army course prerequisites specify that pilots attending the course to become an instructor for the MQ-1C Gray Eagle should (1) hold the enlisted rank of sergeant (E-5), (2) have flown a UAS for a minimum of 200 hours, (3) be designated at readiness level one, and (4) be current in their experience, specifically by having flown a UAS within the last 60 days.

According to an official from the Aviation Center of Excellence, a pilot's battalion commander and the commander of the UAS school are responsible for approving requests to waive these course prerequisites. Following their approval, a pilot's unit commander assesses the pilot's potential to successfully complete the instructor training and fulfill duties required of instructors. The Army waived the instructor course prerequisites for about 40 percent of the UAS pilots attending the course from the beginning of fiscal year 2013 through February 2015. Specifically, the Army waived one or more of these course prerequisites for 38 percent of the pilots who attended the course in fiscal year 2013, 48 percent of the pilots who attended the course in fiscal year 2014, and

---

[35]Again, the Army may waive training and currency requirements for UAS pilots pursuant to Army Regulation 95–23,*Unmanned Aircraft System Flight Regulations* 1-7b, 4-2 (July 2, 2010).

23 percent of the pilots who attended the course from October 2014 through February 2015 (see table 3).

Table 3: Percent of Army Pilots of Unmanned Aerial Systems (UAS) Granted a Waiver[a] to Become an Instructor

	Fiscal year 2013	Fiscal year 2014	October 2014-February 2015	Fiscal Year 2013-February 2015
Number of UAS Pilots With Waivers	37	30	6	73
Total Number of UAS Pilots Attending Instructor Course	98	62	26	186
Percent of Army UAS pilots attending Army school to become UAS instructor who were granted a waiver	38%	48%	23%	39%

Source: GAO analysis of Army data. | GAO-15-461

[a]The statistics in this table show the number and percent of waivers granted to UAS pilots attending the Army UAS instructor courser for the following four course prerequisites: (1) minimum rank, (2) minimum flying hours, (3) that UAS pilots be designated at readiness level one, and (4) that UAS pilots have current flying experience.

The Army has taken some steps to mitigate the potential risks of using less proficient instructors. Specifically, Army Aviation Center of Excellence officials stated that in fiscal year 2015, the Army stopped waiving the instructor course prerequisites that UAS pilots be designated at readiness level one and that pilots be current in their experience flying a UAS. In addition, prior to fiscal year 2015, the Army had provided remedial training to pilots who had not met these two course prerequisites. The Army's action to stop allowing waivers for these two course prerequisites helps to ensure that the pilots it allows to become instructors meet the minimum UAS flying proficiency course prerequisites.

However, the Army has not fully addressed the potential risks of using less proficient and less experienced instructors. Although the Army reduced the number of waivers granted so far in fiscal year 2015 by no longer waiving the course prerequisites related to minimum proficiency, the Army can continue to grant waivers for the course prerequisites related to experience, including that UAS pilots have a minimum number of flying hours in a UAS and hold the minimum enlisted rank of sergeant. In addition, the Army has not provided additional preparation to address the gap in experience for the instructors who have completed the instructor course nor does it have plans to address this gap in experience for those pilots who will attend the course in the future.

Within a strategic training and development process, one core practice calls for agencies to provide appropriate resources for their training programs, and that agency leaders should consistently demonstrate that

they support and value continuous learning.[36] Army officials have stated that experienced instructors are central to providing successful continuous learning to its UAS pilots, and in that regard are important resources in training programs. However, the Army faces risks that by training with less experienced instructors, Army UAS pilots may not be receiving the highest caliber of training needed to prepare them to be able to successfully perform UAS missions in the future. In addition, though the Army expects to face shortages of experienced and proficient UAS pilots through fiscal year 2019, the Army has not fully addressed the potential risks of training with less experienced pilots, such as by providing additional preparation for current and future instructors who do not meet one or more course prerequisites related to experience to enhance their ability to successfully provide training.

The Air Force Has Taken Action to Address Shortages of Instructors at Its UAS Formal Training Unit

The Air Force has taken action to address shortages of instructors at its UAS formal training unit at Holloman Air Force Base. The second major phase of the Air Force's initial qualification training occurs in the formal training unit, and all of the Air Force's active duty UAS pilots are to attend this training to learn to operate the UAS that they will fly in their operational units.[37] As we noted earlier, a core characteristic of a strategic training framework is that agencies should provide appropriate resources for its training programs. However, we found that as of March 2015, the Air Force staffed its UAS training squadrons at Holloman Air Force Base at 63 percent of their planned staffing levels. In December 2014, the commanding general of Air Combat Command stated that the Air Force has not fully staffed the formal training unit due to shortages of UAS pilots across the Air Force and as a result "pilot production has been decimated." An Air Force headquarters official stated that shortages of instructors at the formal training unit are a key reason that the Air Force has shortages of UAS pilots across the Air Force.

An Air Force headquarters official stated that the Air Force is taking action to address these shortages. Specifically, the Air Force is studying the personnel requirements for the formal training unit, and expects the Air Force to report the results of this study by spring 2016. The Air Force

---

[36] GAO-04-546G.

[37] Most active duty Air Force pilots attend the formal training unit at Holloman Air Force Base to learn to fly the Air Force's MQ-1 Predator or MQ-9 Reaper.

official also stated that the results of that study will likely show that the Air Force UAS pilot formal training unit should have additional instructor positions. Although the Air Force formal training unit faces a shortage of UAS instructor pilots, fully implementing our April 2014 recommendations should better position the Air Force to address these shortages.[38]

The Office of the Secretary of Defense and the Services Coordinate to Some Extent but Potential Benefits from Enhanced Coordination Efforts to Train UAS Pilots Exist

The Office of the Deputy Assistant Secretary of Defense (Readiness) and the military services coordinate on UAS pilot training in some distinct areas; however, potential benefits from enhanced coordination efforts on training UAS pilots exist. According to key practices, federal agencies can enhance and sustain their collaborative efforts by defining a common outcome and establishing joint strategies.[39] Collaborating agencies should also assess their relative strengths and limitations to identify opportunities to leverage each others' resources.[40] Further, agencies should establish compatible standards, policies, procedures and data systems to enable a cohesive working relationship.[41]

During our review, in January 2015, the Acting Deputy Assistant Secretary of Defense (Readiness) stated that the services should coordinate and collaborate with one another regarding their efforts to train UAS pilots. He stated that in coordinating with one another the services should share best practices to help the department as a whole train its UAS pilots more effectively and efficiently. Further, the Acting Deputy Assistant Secretary stated that because the services fly similar UAS, they may be able to train their pilots more effectively and efficiently by taking advantage of the lessons learned that they may have acquired as they have trained their pilots separately. He cited similarities between the Air

---

[38]GAO-14-316.

[39]GAO-06-15.

[40]The cited criteria are designed to address interagency collaboration. However, since there are multiple departments within DOD that are responsible for overseeing, planning, and executing UAS pilot training programs, we believe these best practices apply to this intra-agency coordination. We reviewed our adaptation with officials from the Office of the Assistant Secretary of Defense for Readiness. These officials agreed that these practices were relevant to our review.

[41]In 2012, we confirmed these practices and reported on mechanisms for implementing collaborative efforts. See GAO, *Managing For Results: Key Considerations for Implementing Interagency Collaborative Mechanisms*, GAO-12-1022 (Washington, D.C.: Sept. 27, 2012).

Force's Predator and the Army's Gray Eagle and acknowledged similarities between the Air Force's Global Hawk and the Navy's Triton (see Fig. 1).

Figure 1: The Air Force's MQ-1 (Predator), the Army's MQ-1C, (Gray Eagle), the Air Force's RQ-4 (Global Hawk) and the Navy's MQ-4C (Triton)

Air Force Predator

Army Gray Eagle

Air Force Global Hawk

Navy Triton

Source: Defense Video and Imagery Distribution System. | GAO-15-461

In this review of UAS pilot training, we found that the Office of the Deputy Assistant Secretary of Defense (Readiness) and the services have taken some actions to coordinate on UAS training and these actions are consistent with the key practices that can enhance and sustain federal agency coordination. For example, the Air Force and the Army train all Marine Corps UAS pilots, which is consistent with the practice of identifying and addressing needs by leveraging resources to initiate or sustain a collaborative effort. In addition, the Air Force and the Army have published UAS strategies that outline their services' plans to develop, organize and incorporate the use of UAS into their missions, which is consistent with the practice of reinforcing agency accountability for collaborative efforts with plans and reports. However, the Air Force and Army strategies do not address if or how the services will coordinate with

one another on UAS pilot training. Further, we also found that the actions that the Office of the Deputy Assistant Secretary of Defense (Readiness) and the services had taken were not fully consistent with these key practices. See table 4 for a description of these key practices, a description of DOD actions, and our assessment.

Table 4: Key Collaboration Practices and Department of Defense Actions Taken Regarding Training for Pilots of Unmanned Aerial Systems

Key Practice[a]	Our assessment of Department of Defense (DOD) actions
Define and articulate a common outcome: Agencies must have a clear and compelling rationale to work together and must define and articulate a common purpose.	**Inconsistent.** The Office of the Deputy Assistant Secretary of Defense (Readiness) (DASD-Readiness) tasked the RAND Corporation to draft an unmanned aerial system (UAS) training strategy and provided RAND with guidelines about the content and purpose of the strategy.[b] The DASD-Readiness guidelines included a directive to discuss common UAS technologies to avoid duplication among the services. However these guidelines do not direct RAND to link these potential common UAS technologies to training UAS pilots. In September 2014, RAND provided a draft of a UAS training strategy to DASD-Readiness, but the draft also did not discuss a common outcome and a rationale for the services to work together on training UAS pilots. As of April 2015, DASD-Readiness and RAND have not completed a revision to the UAS training strategy draft.
Establish mutually reinforcing or joint strategies: Agencies need to establish strategies that work in concert with those of their partners or are joint.	**Partially consistent.** DASD-Readiness has tasked RAND with drafting a DOD-wide UAS training strategy and has provided RAND with guidelines regarding the content and purpose of the strategy. However, neither the guidelines that DASD-Readiness provided to RAND, nor the draft that RAND provided address any collaborative actions that the services could or should take.
Identify and address needs by leveraging resources: Collaborating agencies should identify the human, information technology, physical, and financial resources needed to initiate or sustain their collaborative effort.	**Partially consistent.** The Air Force and Army train all Marine Corps UAS pilots and the Marine Corps provides instructors to the Army UAS school. However, both the Army and the Air Force are working on addressing UAS personnel shortages. Such shortages may negatively affect the services' ability to sustain any collaborative efforts. Further, a DASD-Readiness official stated that the DASD-Readiness office previously led a UAS summit across the services regarding UAS issues, such as airspace and training. The official added that the summit produced constructive recommendations related to those issues. However, the official also stated that the DASD-Readiness office does not have the staff necessary to lead similar ongoing efforts. Therefore, DASD-Readiness and the services have not fully identified the human, information technology, physical, and financial resources needed to initiate or sustain an effort to collaborate on training UAS pilots across DOD.
Agree on roles and responsibilities: Collaborating agencies should agree on their roles and responsibilities, including how the collaborative effort will be led.	**Inconsistent.** DASD-Readiness and the services have not agreed on roles or responsibilities for any of the services for coordinating on UAS pilot training in a comprehensive manner. The Office of the Under Secretary of Defense for Acquisitions Technology and Logistics established a UAS Task Force in 2007 that is intended to have a coordinating role related to UAS training. The task force's charter states that its mission is to coordinate critical DOD UAS issues and the charter includes a goal that the task force develop and implement initiatives to enhance training. However, a task force official stated that the services did not need to coordinate on their training for UAS pilots because the services fly different UASs with different missions. Further, the official stated that the task force does not, in fact, play a role in coordinating among the services on training for UAS pilots, as outlined in its charter.

Key Practice[a]	Our assessment of Department of Defense (DOD) actions
Establish compatible policies, procedures, and other means to operate across agency boundaries: Agencies need to address the compatibility of standards, policies, procedures, and data systems and to communicate frequently.	**Partially consistent.** The military services have a common set of tactics, techniques, and procedures to promote the interoperability of the services' UAS. However, the service headquarters' response to our questionnaire regarding keeping abreast of the other services UAS training practices was mixed. Additionally, a task force official stated that they did not believe the services had an information-sharing mechanism in place that would be consistent with these key practices.
Develop mechanisms to monitor, evaluate, and report on results: Agencies need to monitor and evaluate their collaborative efforts to enable them to identify areas for improvement.	**Partially consistent.** The Army and Marine Corps monitor their collaborative efforts to train Marine Corps UAS pilots. However, DASD-Readiness and the services do not have a more comprehensive mechanism in place to monitor, evaluate, and report on strategic-level coordination among the services on UAS pilot training.
Reinforce agency accountability for collaborative efforts through agency plans and reports: Agencies can use strategic plans to drive collaboration with other agencies.	**Partially consistent.** The Air Force and the Army have published UAS strategies. In addition, DASD-Readiness tasked RAND to develop a DOD-wide UAS training strategy. However, the Air Force and Army strategies do not address if or how the services will coordinate with one another on UAS pilot training. Moreover, the guidelines provided to RAND for the DOD-wide UAS training strategy do not address this topic.

Source: GAO analysis of DOD information | GAO-15-461

[a]We reported these key practices in Results-Oriented Government: Practices That Can Help Enhance and Sustain Collaboration among Federal Agencies, GAO-06-15 (Washington, D.C.: Oct. 21, 2005). To develop the key practices we reviewed academic literature and prior GAO and Congressional Research Service reports. In addition, we interviewed experts in coordination, collaboration, partnerships, and networks from the National Academy of Public Administration, the IBM Center for The Business of Government, and the University of California, Berkeley. Using our literature review and interviews, we derived a set of practices that we believe can help enhance and sustain federal agency collaborative efforts and that are consistent with results-oriented performance management and agency requirements under the Government Performance and Results Act of 1993.

[b]In 2010, we found that DOD had commenced initiatives to address training challenges, but had not developed a results-oriented strategy to prioritize and synchronize these efforts. We recommended that DOD establish a UAS training strategy to comprehensively resolve challenges that affect the ability of the Air Force and the Army to train personnel for UAS operations and DOD concurred with our recommendation. See Unmanned Aircraft Systems: Comprehensive Planning and a Results-Oriented Training Strategy Are Needed to Support Growing Inventories, GAO-10-331 (Washington, D.C.: Mar. 26, 2010).

In addition, officials from three of the four military service headquarters offices who responded to our questionnaire expressed limited support for further coordination with the other services on UAS pilot training. For example, headquarters officials from the Army and the Air Force stated that they did not anticipate any additional benefit to coordinating with the other services on UAS pilot training. Further, headquarters officials from the Army and the Navy stated that they did not foresee any other benefits from coordinating with the other services on UAS pilot training because their services fly different UAS with different missions.

Moreover, DOD has not yet issued a UAS training strategy that addresses if and how the services should coordinate with one another to share information on training UAS pilots. In 2010, we found that DOD had

commenced initiatives to address training challenges, but had not developed a results-oriented strategy to prioritize and synchronize these efforts. We recommended that DOD establish a UAS training strategy to comprehensively resolve challenges that affect the ability of the Air Force and the Army to train personnel for UAS operations and DOD concurred with our recommendation.[42] The Office of the Deputy Assistant Secretary of Defense (Readiness) engaged the RAND Corporation to draft a UAS training strategy and provided RAND with guidelines about the content and purpose of the strategy. However, these guidelines do not discuss if or how the services should coordinate on UAS pilot training. In September 2014, RAND provided a draft of a UAS training strategy to the Office of the Deputy Assistant Secretary of Defense (Readiness), but the draft also did not discuss coordination on UAS pilot training. As of April 2015, the draft training strategy had not been updated to include this information, and officials from the Office of the Deputy Assistant Secretary of Defense (Readiness) were unable to provide a timeframe for completion of this training strategy.

Until DOD issues a UAS training strategy that addresses if and how the services should coordinate with one another to share information on training UAS pilots, the services may miss opportunities to improve the effectiveness and efficiency of this training. In response to our questionnaire, 6 out of the 11 units stated that potential benefits may exist from coordinating with other services on UAS pilot training. For example, 1 Army UAS unit stated that coordinating training with other services could help shorten the amount of time they spend acclimating to other services once deployed and would allow for an easier transition to working together during missions. Additionally, another Army UAS unit stated that they were unable to train because of a poorly written certificate of authorization, which is the document that requires approval by the Federal Aviation Administration before the services can fly their UAS in the National Airspace System. Further, the unit stated that they could have avoided a temporary halt in training and benefited from reaching out to the Air Force for guidance on this process rather than the unit spending time developing their own system. Without taking steps to address coordination among the services, the Office of the Deputy Assistant Secretary of Defense (Readiness) and the services may waste scarce

---

[42]GAO, *Comprehensive Planning and a Results-Oriented Training Strategy Are Needed to Support Growing Inventories*, GAO-10-331 (Washington, D.C.: Mar. 26, 2010).

funds on training UAS pilots and may limit the efficiency and effectiveness of these training efforts.

Conclusions

DOD's UAS portfolio has grown over the years to rival the traditional manned systems. In its *Unmanned Systems Integrated Roadmap FY2013-2038* report, DOD highlighted the importance of developing a comprehensive UAS training strategy to guide the myriad DOD UAS training efforts across all systems, and to help ensure effective and efficient training of UAS pilots. However, without amending unit status reports to require information on the readiness level of pilots in UAS units, Army Forces Command will continue to lack visibility over the amount of training that UAS pilots have completed in units and will not be able to ensure that all Army UAS units being considered for deployment have completed their required training. In addition, without taking additional steps to mitigate the potential risks of using less experienced instructors, the Army may be unable to ensure that the training these instructors provide will result in highly skilled future UAS pilots. Finally, it is important that DOD identify ways to achieve its missions more efficiently and effectively. It is encouraging that the Office of the Deputy Assistant Secretary of Defense (Readiness) and the services coordinate on UAS pilot training in some areas such as the Air Force and the Army training all Marine Corps UAS pilots and the Air Force and the Army publishing UAS strategies. However, without addressing how the services can enhance their coordination efforts on training UAS pilots in DOD's forthcoming UAS training strategy, the services may not be able to achieve additional benefits to the efficiency and effectiveness of UAS pilot training across the department.

Recommendations for Executive Action

We are making three recommendations to the Secretary of Defense:

- To provide greater visibility over the extent to which Army UAS units have completed required training to leaders responsible for deployment decisions, we recommend that the Secretary of Defense direct the Secretary of the Army to require unit status reports to include information on the readiness levels of UAS pilots in UAS units.

- To help ensure that Army UAS pilots receive the highest caliber of training to prepare them to successfully accomplish UAS missions, we recommend that the Secretary of Defense direct the Secretary of the Army to take additional steps to mitigate potential risks posed by its waiver of course prerequisites for less experienced UAS pilots

attending the course to become instructors, such as by providing additional preparation for current and future instructors who do not meet one or more course prerequisites to enhance their ability to successfully provide training.
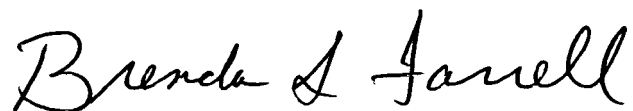
- To increase opportunities to improve the effectiveness and efficiency of UAS pilot training across DOD, we recommend that the Secretary of Defense direct the Under Secretary of Defense for Personnel and Readiness to address how the services should coordinate with one another in the strategy on UAS pilot training that the Office of the Under Secretary of Defense for Personnel and Readiness is current drafting.

Agency Comments and Our Evaluation

We provided a draft of this report to DOD for comment. In written comments, DOD concurred with each of our three recommendations. DOD stated that it will review the implementation status of each of the recommendations within six months. DOD's comments are reprinted in their entirety in appendix III. DOD also provided technical comments that we have incorporated into this report where applicable.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Defense, and the Secretaries of the Air Force, the Army, and the Navy. In addition, the report is available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-3604 or FarrellB@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.

Brenda S. Farrell
Director, Defense Capabilities and Management

List of Committees

The Honorable John McCain
Chairman
The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United States Senate

The Honorable Thad Cochran
Chairman
The Honorable Richard J. Durbin
Vice Chairman
Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable Mac Thornberry
Chairman
The Honorable Adam Smith
Ranking Member
Committee on Armed Services
House of Representatives

The Honorable Rodney Frelinghuysen
Chairman
The Honorable Pete Visclosky
Ranking Member
Subcommittee on Defense
Committee on Appropriations
House of Representatives

Appendix I: Steps Taken by the Air Force to Address 2014 GAO Recommendations Related to UAS Personnel Challenges

In April 2014, we found that the Air Force had shortages of pilots of unmanned aircraft systems (UAS).[1] In particular, we found that the Air Force (1) has operated below its optimum crew ratio, which is a metric used to determine the personnel needs for Air Force aviation units; (2) has not developed a minimum crew ratio; (3) has not tailored its recruiting and retention strategy to align with the specific needs and challenges of UAS pilots; and (4) has not considered the viability of using personnel other than officers such as enlisted or civilians as UAS pilots. We made four recommendations related to these findings. Since we issued our report in April 2014, the Air Force has taken some actions, but has not yet fully implemented them.

In the committee report accompanying a bill for the National Defense Authorization Act for Fiscal Year 2015, the Senate Committee on Armed Services directed that the Air Force report to the committee by September 30, 2014, on its efforts to implement three recommendations from our 2014 report related to staffing levels of Air Force UAS pilots.[2] On September 22, 2014, the Air Force reported on the status of their efforts to implement these recommendations.[3]

---

[1]GAO, Air Force: *Actions Needed to Strengthen Management of Unmanned Aerial System Pilots*, GAO-14-316 (Washington, D.C.: Apr 10, 2014).

[2] S. Rep. No. 113-176 at 26-27 (June 2, 2014).

[3]Air Force, *Comptroller General of the US Review Relating to Remotely Piloted Aircraft* (Sept. 22, 2014).

Table 5: Steps Taken by the Air Force to Address 2014 GAO Recommendations Related to Unmanned Aerial Systems Personnel Challenges

Recommendations from GAO-14-316[a]	Steps Taken by the Air Force to Address Recommendations
Update crew ratios for Unmanned Aerial Systems (UAS) units to help ensure that the Air Force establishes a more accurate understanding of the required number of UAS pilots needed in its units.	**Actions taken, but recommendation not implemented.** Air Force officials stated that, in February 2015, the Air Force completed the first phase of a three-phase personnel requirements study designed to update the UAS unit crew ratio, which is a measure the Air Force uses to determine the personnel needs for Air Force aviation units. The Air Force expects to report results of this study by spring 2016, but Air Force officials stated that the preliminary results of the study indicate that the Air Force may be able to update UAS unit crew ratios and increase the required number of pilots in UAS units. Air Force officials stated that Air Force leadership is reviewing the results of the first phase of the study, but that they expect the Air Force to update the UAS unit crew ratio by summer 2015.
Establish a minimum crew ratio in Air Force policy below which UAS units cannot operate without running unacceptable levels of risk to accomplishing the mission and ensuring safety.	**Actions taken, but recommendation not implemented**. In September 2014, the Air Force reported that the three-phase personnel requirements study would also address our recommendation to establish a minimum crew ratio for UAS units.[b] The Air Force discusses the components of a minimum crew ratio in the Air Combat Command's (ACC) Steady State Concept of Operations, which the Air Force published prior to our 2014 review.[c] However, this minimum crew ratio is not in Air Force policy and Air Force officials stated that the Air Force is not enforcing this minimum crew ratio due to shortages of Air Force UAS pilots. In a December 2014 memo to the Chief of Staff of the Air Force, the ACC's commanding general also made this point when he stated that Air Force units are staffed below the minimum crew ratio. As of March 2015, the Air Force had not established a minimum crew ratio in Air Force policy since our review.

Recommendations from GAO-14-316[a]	Steps Taken by the Air Force to Address Recommendations
Develop a recruiting and retention strategy that is tailored to the specific needs and challenges of UAS pilots to help ensure that the Air Force can meet and retain required staffing levels to meet its mission.	**Actions taken, but recommendation not implemented.** Previously, Air Force cadets who were preparing to join the Air Force and applying for undergraduate flying training volunteered for any of the four careers, including the manned-aircraft pilot career, the UAS pilot career, or two other aviation-related careers. According to Air Force officials, nearly all of the cadets applied for the manned-aircraft pilot career and few applied for any of the other careers. In fiscal year 2014, the Air Force began requiring these cadets to volunteer to serve in any of the four careers. This new process allows the Air Force to assign these cadets to any of the four careers based on a number of factors including the cadet's performance and Air Force needs. An Air Force headquarters official confirmed that in fiscal year 2014, the Air Force met 123 of their 129 UAS pilot accessions goal, or the Air Force's goal for the number of cadets who graduate from Air Force officer schools and agree to serve as UAS pilots. Regarding retention of UAS pilots, in January 2015, the Air Force increased the Assignment Incentive Pay for UAS pilots who are reaching the end of their 6 year service commitment to $1500/month. An Air Force official stated that this increase currently applies to 4 pilots. However, the Air Force does not have a recruiting and retention strategy that is tailored to UAS pilots. Air Force senior leadership and headquarters officials stated that the Air Force is in the process of developing other strategies to recruit and retain UAS pilots.
Evaluate the viability of using alternative personnel populations including enlisted or civilian personnel as UAS pilots to identify whether such populations could help the Air Force meet and sustain required UAS pilot staffing levels.	**Actions taken, but recommendation not implemented.** In April 2014, we reported that Headquarters Air Force officials stated that they have, at times, considered the use of enlisted or civilian personnel but have not initiated formal efforts to evaluate whether using such populations would negatively affect the ability of the Air Force to carry out its missions. Air Force officials stated that in fall 2014, the Air Force Chief of Staff requested that headquarters staff evaluate the potential of using enlisted personnel as UAS pilots. As of March 2015, Air Force officials were not able to provide any details about the assessment they were conducting but confirmed plans to report to the Air Force Chief of Staff by spring 2015.

Source: GAO analysis of Air Force information. | GAO-15-461

Notes:

[a]GAO, Air Force: Actions Needed to Strengthen Management of Unmanned Aerial System Pilots, GAO-14-316 (Washington, D.C.: Apr 10, 2014).

[b]Air Force, Comptroller General of the US Review Relating to Remotely Piloted Aircraft (Sep. 22, 2014).

[c]Air Force, Steady State Concept of Operations (Feb. 20, 2013).

Appendix II: Objectives, Scope, and Methodology

We focused on three types of individual training that the services provide to pilots of unmanned aerial systems (UAS) pilots: initial qualification, mission, and continuation training. In addition, we focused our review on initial qualification instructors and instructors within the units. We focused our review on Army and Air Force UAS pilot training programs in our first two objectives assessing the extent to which the Army and the Air Force face challenges in ensuring that their UAS pilots complete their required training and have a sufficient number of UAS pilot instructors. We focused this part of our review on the Army and the Air Force because these services have significantly more UAS pilots than the Navy and the Marine Corps. However, for our third objective, we assessed the coordination that occurs among the Office of the Deputy Assistant Secretary of Defense (Readiness) and all four of the military services because we determined that there may be benefits to collaboration among the Office of the Deputy Assistant Secretary of Defense (Readiness) and all of the services regardless of the maturity and size of their current UAS training programs.

We assessed the reliability of the data we used to support findings in this report by reviewing documentation of the data and interviewing agency officials knowledgeable about the data and the way they are maintained. Specifically, we assessed the reliability of the Air Force's data on fiscal year 2014 continuation training flights completed by seven UAS units at Creech Air Force Base to fulfill requirements laid out in the Air Combat Command Ready Aircrew Program Tasking Memorandum; the Army's fiscal year 2013 to February 2015 data on waivers granted to UAS pilots attending the UAS school to become instructors; and March 2015 data on the Air Force's UAS pilot staffing levels and staffing levels at the formal training unit. We selected these dates, because they are the most recent years for which the data were available. We determined that these data were sufficiently reliable for the purposes of this report, such as the discussion of the percentage of Army UAS pilots that required a waiver to become a UAS instructor by fiscal year; the overall staffing levels of Air Force UAS pilots; the staffing levels of Air Force UAS instructor pilots at the formal training unit; and the completion of continuation training by a nongeneralizeable sample of seven UAS units at Creech Air Force Base.

To evaluate the extent to which the Army and the Air Force face challenges, if any, in ensuring that their UAS pilots complete their required training, we reviewed documents that outline training requirements for UAS pilots in the Army and the Air Force including the Army's UAS Commander's Guide and Aircrew Training Manual and the Air Force Air Combat Command Ready Aircrew Program Tasking

Memorandum.[1] We also reviewed reports that we previously issued that
address topics related to UAS pilot training including a 2014 report on the
personnel challenges that Air Force UAS pilots face and a 2010 report on
challenges that the Air Force and the Army faced training personnel for
UAS operations.[2]

We assessed the services' UAS pilot training programs using a set of
core characteristics that we previously developed in 2004.[3] In 2004, we
found that agencies must continue to build their fundamental
management capabilities in order to effectively address the nation's most
pressing priorities. To help agencies build their management capabilities,
we developed a framework that includes principles and key questions that
federal agencies can use to ensure that their training investments are
targeted strategically. In developing this framework, we concluded that
there is a set of certain core characteristics that constitute a strategic
training and development process. These characteristics include
leadership commitment and communication; effective resource allocation;
and continuous performance improvement. To develop these
characteristics in 2004, we consulted government officials and experts in
the private sector, academia, and nonprofit organizations; examined laws
and regulations related to training and development in the federal
government; and reviewed the sizeable body of literature on training and
development issues, including previous GAO products on a range of
human capital topics.

To identify the extent to which the military services applied these
principles in their training programs, we developed a questionnaire based
on these characteristics and on the services' UAS training programs. We
adapted these core characteristics by modifying the language of some of
the criteria that we used in our questionnaire, to more appropriately apply
to UAS pilot training. We reviewed our adaptation with officials from the

---

[1]Army Training Circular No. 3-04.61, *Unmanned Aircraft System Commander's Guide and
Aircrew Training Manual* (Jan. 10, 2014); Air Combat Command, *MQ-1 and MQ-9 Ready
Aircrew Program Tasking Memorandum, Aviation Schedule 2014* (Nov. 21, 2013).

[2]GAO, *Air Force: Actions Needed to Strengthen Management of Unmanned Aerial
System Pilots*, GAO-14-316 (Washington, D.C.: Apr 10, 2014) and *Unmanned Aircraft
Systems: Comprehensive Planning and a Results-Oriented Training Strategy Are Needed
to Support Growing Inventories*, GAO-10-331 (Washington, D.C.: Mar. 26, 2010).

[3]GAO, *Human Capital: A Guide for Assessing Strategic Training and Development Efforts
in the Federal Government*, GAO-04-546G (Washington, D.C.: Mar. 2004).

Office of the Deputy Assistant Secretary of Defense for Readiness as well as officials from the headquarters of each of the military services. These officials agreed that the framework was relevant to our review and provided feedback on the questions we included in our questionnaire. We distributed the questionnaire to each of the service's headquarters, training commands, and operational commands. To include diverse UAS unit perspectives, we also randomly selected a nongeneralizable sample of 14 UAS units in each of the services based on factors including aircraft types flown in the UAS unit and geographical location of the unit. We distributed the questionnaire to the commanders of the selected units. We attained an 85 percent response rate for the questionnaires. We analyzed responses we obtained from each of the questionnaires, and compared the perspectives and documentation we collected to the GAO criteria.

We reviewed a March 2015 Army Training and Doctrine Command review that evaluated continuation training for Army UAS units.[4] The results of this review are not generalizable. We also reviewed continuation training requirements included in the Air Force's 2014 Ready Aircrew Program Tasking Memorandum. We compared these requirements to fiscal year 2014 training data for all seven of Creech Air Force Base's MQ-1 Predator and MQ-9 Reaper units that have the same mission requirements outlined in this memorandum.[5] Fiscal year 2014 is the most recent year for which the data were available. The results from these units of this data are not generalizable to other UAS units or fiscal years. We also interviewed Air Force officials at Headquarters, Air Combat Command, Air Education and Training Command, as well as the Vice Wing Commander and multiple UAS unit commanders at Creech Air Force Base and the Wing Commander and Operations Group and multiple UAS unit commanders at Holloman Air Force Base to determine Air Force UAS pilots' training completion rates; the Air Force's UAS manning levels; and metrics that Air Force has in place to determine aviation personnel requirements.

---

[4] We did not assess the validity of the Army March 2015 review's methods or conclusions.

[5] Creech Air Force Base has the most MQ-1 and MQ-9 UAS units in the Air Force. There are seven MQ-1 and MQ-9 UAS units at Creech Air Force Base that are responsible for achieving the mission requirements outlined in the Air Force's 2014 Ready Aircrew Program Tasking Memorandum. We reviewed fiscal year 2014 training completion data for each of those seven UAS units at Creech Air Force Base. Also, an additional four UAS units at Creech Air Force Base do not have the same mission requirements as those included in the memorandum. We did not include these four units in our review.

To determine the extent to which the Army and the Air Force have a
sufficient number of qualified UAS pilot instructors, we identified and
analyzed criteria included in the Army's course prerequisite requirements
that provide the minimum requirements for rank, the number of flying
hours a pilot has flown, the readiness level of a pilot, and whether that
pilot is current, which measures if the pilot has recently completed certain
flying tasks. We compared these course prerequisites to the most recent
Army documentation on UAS operators who attended the Army school to
become an instructor in fiscal year 2013, fiscal year 2014, and October
2014 to February 2015, to determine the number of instructors who met
these course prerequisites. We also interviewed the Director of Training
at the Army's initial qualification school at Fort Huachuca, and officials at
Army Headquarters to get their views about whether the Army school and
units have adequate numbers of instructors.

We also compared Air Force documentation on the actual numbers of Air
Force UAS pilots in Air Force UAS assignments to the Air Force planned
number of positions for UAS pilots. In addition, we compared the actual
numbers of Air Force UAS instructor pilots at the formal training unit at
Holloman Air Force Base to the Air Force planned number of positions at
the formal training unit. The formal training unit is the organization that
provides training for the second major phase of the Air Force's initial
qualification training and all of the Air Force's active duty UAS pilots are
to attend this training to learn to fly the MQ-1 Predator or MQ-9 Reaper.
We also interviewed the Wing Commander and Operations Group and
multiple UAS unit commanders at the Air Force's formal training unit at
Holloman Air Force Base to get their views about whether the formal
training units have a sufficient numbers of instructors.

We visited UAS units at five bases: Ft. Huachuca, AZ; Ft. Hood, TX;
Holloman Air Force Base, NM; Creech Air Force Base, NV; and Marine
Corps Air Station Cherry Point, NC. We chose units at these locations to
get a perspective on a variety of UAS operations and selected the
locations on the basis of several factors including the type and size of
UAS flown in the unit; missions of the unit; whether or not the unit is
deployed (we did not meet with units who were deployed); number of
UAS pilots in the unit; the major command of the unit; and location of the
unit. At each instillation, we met with unit commanders and other leaders
to discuss their views about training UAS pilots.

We also conducted 18 focus groups with active-duty UAS pilots at these
locations to gain their perspectives on their services' UAS training efforts.
We met with eight Army focus groups, seven Air Force focus groups, and

three Marine Corps focus groups for 90 minutes each.[6] To select specific
UAS pilots to participate in our focus groups, we worked with officials at
each of the instillations to develop a diverse group of active-duty UAS
pilots. To obtain a variety of perspectives, we selected UAS pilots with
various amounts of experience flying UASs and additional duties in their
units. To help ensure an open discussion in the groups, we organized
them by rank and met with groups of similar rank. We also met with some
groups of instructor pilots separately. These groups typically consisted of
six to nine UAS pilots.

We used content analysis to analyze detailed notes from each focus
group to identify themes that participants expressed across all or most of
the groups. To do this, two GAO analysts analyzed an initial set of the
records and individually developed themes. Then, they convened to
discuss and agree on a set of themes to perform the coding. The analysts
then analyzed our records and made coding decisions based on these
themes. Following the initial analysis by one analyst, a second analyst
reviewed all of the coding decisions that the first analyst made for each of
the records. Where there were discrepancies, the analysts reviewed one
another's coding and rationale for their coding decisions and reached a
consensus on which codes should be used. The results of our analyses of
the opinions of UAS pilots we obtained during our focus groups are not
generalizable to the populations of all UAS pilots in the Army, Air Force,
and Marine Corps.

To evaluate the extent to which DOD and the military services coordinate
and collaborate with one another to train their UAS pilots, we used criteria
for enhancing and sustaining collaboration among federal agencies that
we previously developed.[7] We assessed the department's actions using
seven of the eight key practices from our prior report. We excluded one
key practice related to reinforcing individual accountability for
collaborative efforts through performance management systems.
Evaluating this practice involves assessing the extent to which agencies
set expectations for senior executives for collaboration within and across

---

[6] We did not conduct Navy focus groups because its pilots would not be able to discuss
the Navy's current training program. Previously, contractors trained all of the Navy's UAS
pilots however, in January 2015 the Navy began training its pilots, which includes an
additional two weeks of instruction.

[7] GAO, *Results-Oriented Government: Practices That Can Help Enhance and Sustain
Collaboration among Federal Agencies*, GAO-06-15 (Washington, D.C.: Oct. 21, 2005).

organizational boundaries in their individual performance plans. We did
not include this key practice in our review because many of the officials
who oversee UAS pilot training in the services are military members and
the military does not establish individual performance plans for its
servicemembers. We reviewed our adaptation with officials from the
Office of the Deputy Assistant Secretary of Defense for Readiness. These
officials agreed that these practices were relevant to our review. The
seven key practices that we assessed in our review were: (1) defining and
articulating a common outcome; (2) establishing mutually reinforcing or
joint strategies; (3) identifying and addressing needs by leveraging
resources; (4) agreeing on roles and responsibilities; (5) establishing
compatible policies, procedures, and other means to operate across
agency boundaries; (6) developing mechanisms to monitor, evaluate, and
report on results; and (7) reinforcing agency accountability for
collaborative efforts through agency plans and reports.

To identify the extent to which the DOD organizations applied these
practices, we analyzed documentation related to coordination on UAS
pilot training that we obtained from a variety of DOD offices. For example,
we analyzed guidelines for a UAS training strategy that the Office of the
Deputy Assistant Secretary of Defense for Readiness provided to the
RAND Corporation; a draft UAS training strategy developed by the RAND
Corporation; UAS strategies that the Army and Air Force issued; and
documentation that shows that the Air Force and Army train all Marine
Corps UAS pilots. In addition, we analyzed responses we obtained from
each of the questionnaires we administered and focused on questions
related to coordination among the services. Further, we collected
additional information in interviews with officials from the Office of the
Deputy Assistant Secretary of Defense for Readiness, the UAS Task
Force, and knowledgeable officials within each military service. We then
compared the information we collected from these sources to the key
practices that help enhance and sustain coordination that we previously
developed to determine the extent to which the Office of the Deputy
Assistant Secretary of Defense for Readiness and the military services
coordinate to train UAS pilots.

We conducted this performance audit from July 2014 to May 2015 in
accordance with generally accepted government auditing standards.
Those standards require that we plan and perform the audit to obtain
sufficient, appropriate evidence to provide a reasonable basis for our
findings and conclusions based on our audit objectives. We believe that
the evidence obtained provides a reasonable basis for our findings and
conclusions based on our audit objectives.

Appendix III: Comment from the Department of Defense

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

READINESS AND FORCE
MANAGEMENT

MAY 11 2015

Ms. Brenda Farrell
Director, Defense Capabilities and Management
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Farrell:

This is the Department of Defense (DoD) response to the GAO Draft Report, GAO-15-461, 'UNMANNED AERIAL SYSTEMS: Actions Needed to Improve DoD Pilot Training,' dated April 17, 2015 (GAO Code 351953). The DoD concurs with the attached GAO recommendations.

My point of contact for this effort is Mr. Frank DiGiovanni at 703-695-2618, or by email (NIPR) at frank.c.digiovanni.civ@mail.mil. Thank you again for the opportunity to review this report.

Daniel P. C. Feehan
Deputy Assistant Secretary of Defense
Readiness

Attachment:
As stated

GAO DRAFT REPORT DATED APRIL 17, 2015
GAO-15-461 (GAO CODE 351953)

"UNMANNED AERIAL SYSTEMS: ACTIONS NEEDED TO IMPROVE DOD
PILOT TRAINING"

DEPARTMENT OF DEFENSE COMMENTS
TO THE GAO RECOMMENDATION

RECOMMENDATION 1: The GAO recommends that the Secretary of Defense direct the
Secretary of the Army to require unit status reports to include information on the readiness levels
of UAS pilots in UAS units.

DoD RESPONSE: Concur

DoD will work with the Secretary of the Army to enhance UAS Operator readiness reporting
through proposed changes to Department of the Army Pamphlet 220-1 Defense Readiness
Reporting System (DRRS) - Army. This effort, led by the Army's Forces Command
(FORSCOM) in coordination with Training and Doctrine Command (TRADOC), will expand
UAS Operator reporting requirements to include changes to the DRRS-Army electronic database.
DoD will review the implementation status of these reporting requirement changes with the
Secretary of the Army within six months.

RECOMMENDATION 2: The GAO recommends that the Secretary of Defense direct the
Secretary of the Army to take additional steps to mitigate potential risks posed by its waiver of
course prerequisites for less experienced UAS pilots attending the course to become instructors,
such as by providing additional preparation for current and future instructors who do not meet
one or more course prerequisites to enhance their ability to successfully provide training.

DoD RESPONSE: Concur

DoD will work with the Secretary of the Army to develop a mitigation plan to reduce the
underlining issues that require waivers to the instructor operator course prerequisites. DoD will
review the development status of a proposed mitigation plan with the Secretary of the Army
within six months.

RECOMMENDATION 3: The GAO recommends that the Secretary of Defense direct the
Under Secretary of Defense for Personnel and Readiness to address how the services should
coordinate with one another in the strategy on UAS pilot training that the Office of the Under
Secretary of Defense for Personnel and Readiness is currently drafting.

DoD RESPONSE: Concur

2

The Office of the Under Secretary of Defense for Personnel and Readiness is currently revising its draft "Department Of Defense Training Strategy For Unmanned Aircraft Systems" to address inter-service coordination to enable the Department to train more efficiently and effectively as a whole. The proposed changes will be staffed among the service officials to seek review and comment within the next six months.

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

Brenda S. Farrell, (202) 512-3604 or FarrellB@gao.gov

Staff Acknowledgments

In addition to the contact named above, Lori Atkinson (Assistant Director), James P. Klein, Leigh Ann Sennette, Michael Silver, Paola Tena, Alex Welsh, Erik Wilkins-McKee, and Michael Willems made key contributions to this report.